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A GENERALIZATION OF THE WILCOXON TEST FOR CENSORED DATA, II

—SEVERAL-SAMPLE PROBLEM—

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1. Introduction

Let X_{i1}, $X_{i2},\cdots,X_{in_i}$ be a random sample from the i-th population Π_i with the distribution function $F_i(x)$ $(i=1, 2, \cdots, c)$, such that for non-negative p_i less than 1,

$$(1.1)\qquad \Pi_i : F_i(x) = \begin{cases} p_i+\int_0^x f_i(t)dt & x\geqq 0 \\ 0 & x<0 . \end{cases}$$

We consider to test the hypothesis H defined by

$$(1.2)\qquad \begin{array}{l} F_1 = F_2 = \cdots = F_c \quad \text{or equivalently} \\ p_1 = p_2 = \cdots = p_c \ (= p_0, \text{ say) and } f_1 = f_2 = \cdots = f_c \end{array}$$

in generalizing the two nonparametric tests due to Kruskal and Wallis [4] and Bhapkar [2]. For this purpose we shall introduce new test statistics in section 3 and 4 by using the concept of midrank as considered by Kruskal and Wallis [4] and Putter [6] and show that these two test statistics with some suitable multipliers are distributed asymp totically as χ^2_{c-1} under the hypothesis H. When $c=2$, these test statistics coinside with the one treated in my previous paper [7] which is a generalization of the Wilcoxon test. Finally we shall apply these tests to the data of cleft-palate patients provided by Dr. A. Takayori, Dental School, Osaka University.

2. Preliminary

We shall make use of the result concerning the generalized U-statistics stated in Bhapkar [2] and Lehmann [5]. Let $\phi(x_{11},\cdots,x_{1m_1};\cdots; x_{c1},\cdots,x_{cm_c})$ be symmetric in each set of $x_{i1},\cdots,x_{im_i}$ $(i=1, 2,\cdots,c)$ and put